DOCUMENT RESUME

ED 035 599 24 SP 003 512

AUTHOR	Kiser, Luther; And Others
TITLE	Project Evaluation: The Effect of Selected Media Feedback upon the Interactive Behavior of Student Teachers. Final Report.
INSTITUTION	Missouri Univ., Columbia. Coll. of Education.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR 8-F-052
PUB DATE	Oct 69
GRANT	OEG 6-9-008052-0033 (057)
NOTE	61p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$3.15
DESCRIPTORS	*Behavior Change, Classroom Observation Techniques, Feedback, Instructional Media, *Interaction Process Analysis, Preservice Education, *Student Teachers, *Supervisory Methods, Teacher Educator Education, *Video Tape Recordings
IDENTIFIERS	Flanders Interaction Analysis Scale

ABSTRACT

The purpose of this research project was to ascertain the medium (i.e., video tape, audio tape, or regular supervisory feedback) that had the greatest impact in changing the classroom interactive behavior of selected student teachers as measured by Flanders' interaction analysis categories. The study involved three matched groups of student teachers of English (video experimental, audio experimental, and control), each of which received one of the types of feedback from one of two supervising teachers. Data was subjected to the two-tail test of significance at the .05 level of confidence. Although change in instructional behavior occurred in all three groups, and although the magnitude of the directional change was greater for student teachers receiving video or audio recorded feedback than for teachers in the control group, the only statistically significant behavior change occurred in the video experimental group. Members of this group exerted significantly less "direct teaching influence" and significantly more "indirect teaching influence." Findings and conclusions suggest that utilizing video recorded classroom interaction as part of the supervisory process has positive results and that the effect of both video and audio supplemented supervisory feedback could be enhanced by having supervising teachers highly trained in the use of various feedback media. (Author/JS)

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Final Report

Project No. 8-f-052

Contract No. OEG-6-9-008052-0033-(057)

PROJECT EVALUATION:
THE EFFECT OF SELECTED MEDIA FEEDBACK UPON THE INTERACTIVE BEHAVIOR OF STUDENT TEACHERS

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October 31, 1969

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent offical Office of Education position or policy.

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Bureau of Research

SP003 512

ACKNOWLEDGMENTS

Special appreciation is reserved for Mrs. Jan Gooden and Mrs. Barbara Payne, the two English supervisors at the University of Missouri, Columbia Laboratory School whose support and assistance made this research possible.

Sincere appreciation is expressed to the following persons who contributed to this investigation:

Dean Bob G. Woods of the College of Education, University of Missouri, Columbia; Dr. Frank Heagerty, Director of the University of Missouri, Columbia Laboratory School; Mr. Richard Simms, Administrative Assistant of the University of Missouri, Columbia Laboratory School for their general administrative support.

Mr. Jon Paden for his technical assistance with the computer work and patient aid in the statistical analysis of the data.

Mr. Don Mitchell and Mr. Ron Turner, Director and Associate Director of the University of Missouri, Columbia Office of Instructional Television, for their assistance and continued technical assistance.

Mr. Norris Fox and Mr. Fred Gies, the former for coding all the classroom interaction recordings utilizing the Flanders' Interaction Analysis System, the latter for assistance in copy editing and both for their general encouragement.

The twenty four student teachers of Language Arts at the University of Missouri, Columbia Laboratory School during the school year 1968-1969, without whose cooperation the study could not have been conducted.

All other staff members of the Center for Educational Improvement for professional services rendered to this study.

Mrs. Linda Gottreu for her patient and capable assistance in preparing and typing the manuscript.

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SUMMARY OF THE FINAL REPORT

Introduction

The classroom teacher remains the most potent force in fashioning the educational environment for students. Research is needed to identify teacher behavior conducive to optimum learning for students and appropriate techniques for instilling these behaviors through the pre-service and in-service training of teachers. The research should, obviously, be conducted in the learning setting itself in order to ensure relevancy to the learner. The systematic observation of classroom activities as well as the effects of video and audio tape recording of student teacher behavior are areas of educational research much overlooked. This study attempted to provide reliable data relative to the effects of feedback utilizing video and audio aids by the supervisor. The change in verbal interaction patterns was the criterion measure.

To ascertain the effects of media feedback, this study was designed as a true experimental model. That is to say that the subjects were divided into three equal groups, two experimental and one control, with the experimental groups receiving media assisted supervisory feedback between the pre- treatment and post-treatment data collection periods.

Nature of the Problem

Ascertaining the effect of video and audio recorded feedback in addition to normal supervisory feedback upon the classroom verbal interaction of student teachers was the problem with which this study was concerned.

A review of the literature disclosed few empirical investigations germane to the problem. While many studies reported wide use of video and/or audio feedback to teachers, few have attempted to measure the impact of such feedback in an objective manner. This lack of empirical evidence concerning the effect of video and/or audio recorded feedback to teachers demonstrated a need for this study.

Statement of the Problem

Do student teachers receiving supervisory feedback with the aid of video tape replay demonstrate a greater change in their classroom verbal interactive behavior than student teachers who receive supervisory feedback with the aid of audio tape replay of the class session or a control group who receive supervisory feedback with no video or audio feedback?

General Research Questions

This study attempted to answer the following questions:

1. Will the act of seeing and hearing oneself teach via video tape recordings effect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

2. Will the act of hearing oneself teach via audio tape recordings effect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

3. Will the act of seeing and hearing oneself teach via video tape recordings effect a greater change in one's verbal teaching behavior than hearing oneself teach via audio tape recordings while discussing the teaching activity with a supervisor?

Research Methods

In general, the research procedures utilized in this study were as follows. In both the fall and winter semester twelve student teachers of English were selected, matched on grade point average and assigned to one of three groups: (1) video experimental; (2) audio experimental; or (3) control. During both semesters, each student teacher was audio and video taped in the process of teaching. At a minimum such data were collected before and after the treatment procedure. During the course of both semesters, each student teacher received feedback from her respective supervising teacher, according to her assigned group. The independent variables for the study were the three different kinds of feedback and the dependent variable was the classroom verbal interaction of the student teachers. The verbal interaction was measured and codified by use of Flanders' Verbal Interaction Analysis System. Two supervisors of English classes at the Laboratory School, University of Missouri, Columbia, were utilized in this study. Each supervisor worked with six student teachers each semester of the school year 1968 through 1969.

Collection of the Data

Student teacher-directed classroom sessions were audio taped on five occasions during each semester for the purpose of data collection. A fifteen minute randomly selected segment of each audio taped session was coded utilizing Flanders' Interaction Category System. The same trained coder classified all tapes for both semesters to maximize internal consistency. Consistent with the

accepted use of Flanders' system, the classroom interaction was codified each three seconds and/or each category change.

Limitations of the Study

A limiting factor to be considered in this study was the utilization of two supervising teachers. However, it was impossible to work with twenty four student teachers with only one supervisor. A second factor which could have a limiting effect was the nature of the first data collection. That is to say each of the student teachers had observed their supervising teacher several days prior to the initial audio recordings.

The Treatment Procedures

Feedback sessions between student teacher and supervisor corresponded with the data collection periods. One third of the student teachers were shown video tapes of their teaching sessions, one third listened to audio tapes of their teaching sessions, and one third merely discussed their teaching sessions with the supervisor.

Findings of this Study

1. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represents "teacher lecture." The resultant T value was found to be significant at .02 level of confidence.

2. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represented "direct teaching influence." The resultant T value was found to be significant at .02 level of confidence.

3. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for categorical data which represented the "indirect teaching influence." The resultant T value was found to be significant at .01 level of confidence.

4. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represented "student talk." The resultant T value was found to be significant at .05 level of confidence.

5. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "direct teaching influence." The resultant T value was found to be 10 and nonsignificant at .05 level of confidence.

6. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "indirect teaching influence." The resultant T value was found to be 16 and nonsignificant at .05 level of confidence.

7. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "student talk." The resultant T value was found to be 5 and nonsignificant at .05 level of confidence.

8. The audio group demonstrated a percent score decrease in "indirect teaching" compared to an increase for the video group and control group.

9. Data obtained for pre- treatment and post- treatment percent scores for all three groups demonstrated no significant differences between groups by interaction category.

Significant Conclusions

Within the limitations of this study, the following conclusions were synthesized from the findings:

1. There is evidence that the process of video recording student teachers in the act of teaching, and utilizing the recorded teaching sequence as feedback as a supplement to the regular supervisory procedures, tends to change some aspects of the student teachers' instructional behavior. Specifically, the evidence indicates that the student teachers receiving video feedback utilize less "direct teaching influence" and more "indirect teaching influence" as categorized by Flanders' Verbal Interaction Analysis System.

2. Utilizing the process of audio recording student teachers in the act of teaching and subsequently studying the recorded teaching sequence with the supervising teacher, effects some change in the instructional behavior of the

student teacher. However, it was evidenced in this study, that within the audio group, the magnitude of change in the student teachers' instructional behavior was not statistically significant.

3. The process of supervisory feedback to student teachers, regardless of whether such feedback was supplemented by video or audio recordings of the student teaching act, demonstrated directional changes in instructional behavior as measured by Flanders' Ten Categories when compared to "ideal" category goals postulated by another study.

4. The magnitude of the directional change is greater for those student teachers receiving video or audio recorded feedback than the magnitude of change in the control group. However, the difference in the magnitude of change in each of Flanders' Ten Categories between the three groups was not statistically significant.

The following implications were postulated from the general findings and conclusions of this study:

1. Acknowledging the need to provide more effective supervisory feedback to aid the student teacher in his professional training, it seems reasonable to infer from this study that utilizing video recorded classroom interaction as part of the supervisory process would have positive results.

2. The effect of video and audio supplemented supervisory feedback could be enhanced by having supervising teachers highly trained in the use of various feedback media.

CHAPTER I

INTRODUCTION

The classroom teacher remains the most potent force in fashioning the educational environment for students. Research is needed to identify teacher behavior conducive to optimum learning for students and appropriate techniques for instilling these behaviors through the pre-service and in-service training of teachers. The research should, obviously be conducted in the learning setting itself in order to ensure relevancy to the learner. The systematic observation of classroom activities as well as the effects of video and audio tape recording of student teacher behavior are areas of educational research much overlooked. This study attempted to provide reliable data relative to the effects of feedback utilizing video and audio aids by the supervisor. The change in verbal interaction patterns was the criterion measure. If change can be accomplished by focusing on one small aspect of the teaching function, other segments of the teaching act might be changed using the type of feedback system which makes a significant contribution to change.

To ascertain the effects of media feedback, this study was designed as a true experimental model. That is to say that the subjects were divided into three equal groups, two experimental and one control, with the experimental groups receiving media assisted supervisory feedback between the pre- treatment and post-treatment data collection periods. In this manner, if a significant change in the criterion measure -- classroom verbal interaction -- was found, inferences could be made about the effect of the media assisted supervisory feedback systems.

The ultimate aim of this study thus became the ascertainment of the apparent benefits of media assisted feedback. Since this fact was disclosed it has implications for both pre-service and in-service training programs.

Statement of the Problem

Do student teachers receiving supervisory feedback with the aid of video tape replay demonstrate a greater change in their classroom verbal interactive behavior than student teachers who receive supervisory feedback with the aid of audio tape replay of the class session or a control group who receive supervisory feedback with no video or audio feedback?

Statement of Purpose

The purpose of this investigation was to add to the body of knowledge about supervisory feedback systems. Specifically, this was accomplished through the utilization of video and audio tape recordings in a system of supervisory feedback. The work of Flanders provided an instrument to assess specific behavior.[1]

Need for the Study

Teaching is behavior, and as behavior, it is subject to analysis and change. Teachers function in an environment requiring considerable verbal interaction. This study dealt with one aspect of teaching behavior, the verbal interaction that took place in a classroom situation among teacher and students. A teaching act, viewed by different individuals, is difficult to analyze with common understandings for all involved. The many efforts aimed at measuring the classroom behavior of teachers by systematic observation are reflected in the Handbook of Research on Teaching by Medley and Mitzel.[2] "Any technique or method that would provide the basis for common understanding of a particular activity would be of value to teachers and supervisors."

Amidon addressed himself to the vital nature of this concern:

> The primary responsibility of the classroom teacher is to guide the learning activities of children. As he helps children to learn in the classroom situation, the teacher, as the leader interacts with the children both as individuals and as a group. In the process of this interaction, he influences the children, sometimes intentionally without planning, but often without awareness of his behavior and the effect of this behavior on the learning process.
>
> The teacher then is continually exerting influence on the children and on the learning situation. But how much knowledge does he have about the methods of influence he is using? How much control is he able to exert over his behavior in the classroom? By studying his own behavior in some systematic, objective manner, the

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[1]Ned A. Flanders, Teacher Influence, Pupil Attitude and Achievement, Minneapolis: University of Minnesota, 1960, (U.S. Office of Education, Coop. Research Project, No. 397, mimeographed).

[2]Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," Handbook of Research on Teaching. Chicago: Rand McNally and Col, 1963 AERA ed. N.L. Gage, pp. 247-328.

teacher may gain further insight into his behavior, he may decide, as many teachers have decided, that he wants to change his behavior because he either is not achieving what he thought he was achieving, or he is not achieving what he has now decided he wants to achieve on the basis of new insights about how children learn.[3]

The study of one's behavior in the classroom requires some method or system of feedback. Traditionally this has been accomplished with the aid of a supervisor who observed the classroom and then provided an interpretation of what had been observed. Feedback to the teacher should include some opportunity for the teacher to be as closely associated with his actual teaching situation as possible. Audio tape recording, and most recently, video tape recording of the teaching situation are two media through which the teacher may observe himself. Currently there is some belief that video tape and/or audio tape replay of a teaching activity is of value to teachers but objective evidence appears to be limited. Shibota's work in Nebraska, like other research, reports only subjective evidence.[4] The limited amount of reported research based upon empirical data indicated the need for this study.

General Research Questions

This study attempted to answer the following questions:

1. Will the act of seeing and hearing oneself teach via video tape recordings effect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

2. Will the act of hearing oneself teach via audio tape recordings effect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

3. Will the act of seeing and hearing oneself teach via video tape recordings effect a greater change in one's verbal teaching behavior than hearing oneself teach via audio tape recordings while discussing the teaching activity with a supervisor?

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[3]Edmund J. Amidon and Ned A. Flanders, The Role of the Teacher in the Classroom, Minneapolis: Association for Productive Teaching, 1967, pp. 1-2.

[4]Kenneth E. Shibota, "Emancipating the Teacher," Phi Delta Kappan, Bloomington, Ind.: Phi Delta Kappa, Inc., November 1968, p.171.

Statistical Hypotheses

The following null hypotheses were tested during the conduct of this study:

1. There is no significant difference between the three groups as tested by the Kruskal-Wallis one-way analysis of variance test.[5]

2. Within the video experimental group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for Verbal Interaction Category 5, "Lecture."

3. Within the audio experimental group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for Verbal Interaction Category 5, "Lecture."

4. Within the control group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for Verbal Interaction Category 5, "Lecture."

5. Within the video experimental group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for the combined Interaction Categories 1, 2, 3 and 4, "indirect teaching influence."

6. Within the audio experimental group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for the combined Interaction Categories 1, 2, 3 and 4, "indirect teaching influence."

7. Within the control experimental group there is no significant difference between the pre- treatment percent score and the post- treatment percent score for the combined Interaction Categories 1, 2, 3 and 4, "indirect teaching influence."

8. Within the video experimental group there is no significant difference between the pre- treatment percent score

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[5]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences, McGraw Hill, New York, 1956, pp. 184-94.

and post- treatment percent score for the combined Interaction Categories 8 and 9, "student talk."

9. Within the audio experimental group there is no significant difference between the pre- treatment percent score and post- treatment percent score for the combined Interaction Categories 8 and 9, "student talk."

10. Within the control experimental group there is no significant difference between the pre- treatment percent score and post- treatment percent score for the combined Interaction Categories 8 and 9, "student talk."

11. Within the video group there is no significant difference between the pre- treatment percent score and post- treatment percent score for the combined Interaction Categories 5, 6 and 7, "direct teaching influence."

12. Within the audio group there is no significant difference between the pre- treatment percent score and post- treatment percent score for the combined Interaction Categories 5, 6 and 7, "direct teaching influence."

13. Within the control group there is no significant difference between the pre- treatment percent score and post-treatment percent score for the combined Interaction Categories 5, 6 and 7, "direct teaching influence."

Definition of Terms

Feedback System refers to any method used to provide the student teacher with an evaluation of his teaching activity. The ideal feedback should contain an opportunity for recreating the actual teaching activities.

Regular Supervisory Technique is the phrase given to the activity engaged in when a student teacher and a supervisor discuss a segment of the teaching activity that has been observed by the supervisor.

Verbal Interaction Analysis refers to teacher talk and student talk that occur in the classroom. The specific form for analysis as developed by Flanders was used in this study.

Flanders' Interaction Analysis (FIA)is a ten category system that identifies teacher talk as indirect or direct and student talk as responsive or initiative. Indirect teacher influence has four categories: Accepts feelings, praises or encourages, accepts or uses ideas of student and asks questions. Direct teacher

influence has three categories: Lecturing, giving directions, and criticizing or justifying authority. The tenth category is designated as Silence or Confusion. Appendix A summarizes these categories.

Collection of Interaction Data

The verbal communication behavior in the classroom was analyzed in three second segments and/or category changes with the number of the appropriate category written in a sequence in a column. These data were then placed in a ten by ten matrix by pairing each three second segment with the next sequential segment. (See Appendix B) The matrix was entered from the left row first and tallied in the appropriate column. If the teacher was lecturing and stopped to ask a question, the matrix tally was at the intercept row 5, column 4. The action of a student answering that question was tallied at the intercept of row 4, column 8.

Of specific importance to this study was the combination of categories 1, 2, 3 and 4, "non-direct teacher influence;" categories 5, 6 and 7, "direct teacher influence" and categories 8 and 9, "student talk." Category 5 which is teacher lecture was subject to separate analysis.

CHAPTER II

RELATED LITERATURE

Much of the literature in the field of video feedback of teaching situations is related to the pre-service education of teachers.

Reporting in this area were Schueler, Gold and Mitzel[6]; Hunter and Amidon[7]; Clayton[8]; Moody[9]; Allen and Young[10]; Childs[11]. Analysis of these articles indicated that evaluation of an empirical nature was limited and that further research was needed.

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[6]Herbert Schueler, Milton J. Gold, and Harold Mitzel. :The Use of Television for Improving Teacher Training and for Improving Measures of Student Teaching Performance," (Phase I. Improvement of Student Teaching.) New York, N.Y.: Hunter College of the City University of New York, 1962.

[7]Elizabeth Hunter and Edmund Amidon. "Direct Experiences in Teacher Education: Innovation and Experimentation," Journal of Teacher Education, 17: Fall, 1966. pp. 282-289.

[8]Thomas E. Clayton, "Using Video Tape Activities in Teacher Education," Television and Related Media in Teacher Education, H.E. Bosley and H.E. Wigren, eds. Baltimore: Multi-State Teacher Education Project, 1967. pp. 14-18.

[9]William B. Moody, "The Use of Video Tapes in the Preparation of Elementary School Teachers in Arithmetic," Television and Related Media in Teacher Education. H. E. Bosley and H. E. Wigren, eds. Baltimore: Multi-State Teacher Education Project, 1967. pp. 18-20.

[10]D. W. Allen and D. B. Young, "Video Tape Techniques at Stanford University," Television and Related Media in Teacher Education. H. E. Bosley and H. E. Wigren, eds. Baltimore: Multi-State Teacher Education Project, 1967. pp. 23-25.

[11]John W. Childs, "The Use of Video Recording in Teacher Education," Television and Related Media in Teacher Education, H. E. Bosley and H. E. Wigren, eds. Baltimore: Multi-State Teacher Education Project, 1967. pp. 25-27.

Stoller and Lesser[12] described various methods of observing classroom activity between teachers and pupils. They compared direct observation, kinescope observation and a combination of both techniques. Findings were inconclusive, and further research was suggested. Lamb's[13] research was directed toward observational facilities and equipment needed in Laboratory Schools and was not concerned with teacher-pupil verbal interaction.

Greenhill[14] supported research studies dealing with the evaluation of teaching techniques by the use of video tape. He expressed the opinion that more study and evaluation was needed in the recording and analysis of teaching demonstrations by student teachers, and that discussion of such demonstrations was important.

Dr. John Mulhern[15] at the North Central Association meeting, Chicago, Illinois, March 24-28, 1967 presented a paper, "The New Emphasis in Student Teaching." Mulhern presented his views toward the solution of problems presented by student teaching and stated a belief that teacher education must keep abreast of technological innovations applicable to teacher education. Among his suggestions were: 1. Student teachers could be introducted to laboratory experiences that include analysis of video tapes of children; and 2. Some student teaching could be conducted in a television studio with critique and analysis of video tapes by student teachers. Mulhern was convinced of the worth of such technology, but he made no mention of scientific evaluation and the effectiveness of utilizing such technology.

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[12]Nathan Stoller and Lesser, "The Use of Television for Improving Teacher Training and for Improving Measures of Student Teaching Performance," (Phase II, a comparison of methods of observation in pre-service teacher training. U.S. Office of Ed., Grant No. 730035, New York: Hunter College of the City University of N.Y., 1963)(mimeographed).

[13]Luke Lamb, "Planning Closed Circuit Television Systems for Laboratory Schools of Teacher Education," (unpublished doctoral dissertation, University of Missouri, 1961).

[14]Leslie P. Greenhill, Abstracts of Research on Instructional Television and Film, (ed. Donald W. MacLeman and J. Christopher Reid. Stanford University: Institute for Communication Research, 1964), p. 13.

[15]John D. Mulhern, "The New Emphasis in Student Teaching," The North Central Association Quarterly, Vol. XIII (Summer, 1967), p. 205.

Voth's[16] work, also with student teachers, directed its efforts toward the concept of changing behavior through video feedback of classroom verbal interaction. This study was limited to thirteen pairs of student teachers working in the Hickman High School in Columbia, Missouri. The small, localized sample affects the generalizability of the findings, but the design was otherwise adequate. The amount of feedback available or the video tape replay time possible was uncontrolled, and at the conclusion of the project, the only significant differences were found in the sub-group which had availed itself of several video tape replay sessions (up to 13 hours as opposed to two hours). Scheduling of feedback seemed to be the major difficulty in accounting for this difference.

This finding would support the belief that feedback needs to be systematized and that two hours a semester spent on personal evaluation as related to video tape feedback is inadequate. The Voth study concluded:

> The major conclusion of the analysis of these data would have to be that viewing oneself in the act of teaching does not, within itself, fulfill the need for self-improvement. This is demonstrated by the attitude and opinions of the experimental group as compared to the control group on the strengths of the project where the control group listed the strengths as being actually seeing oneself teach, the experimental group listed the work of the confidant in assisting the student interpret what he saw as being the most beneficial to him. This fact readily verifies the conclusion that assistance in interpretation and analysis of the video recording by a qualified professional is more beneficial than simply viewing oneself in the act of teaching.[17]

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[16]John A. Voth, Helping Student Teachers Change Their Behavior, University of Missouri, College of Education, Columbia, Missouri, 1967.

[17]Ibid., p. 61.

CHAPTER III

RESEARCH METHODS

In general, the research procedures utilized in this study were as follows. In both the fall and winter semester twelve student teachers of English were selected, matched on grade point average and assigned to one of three groups: (1) video experimental; (2) audio experimental; (3) control. During each semester, every student teacher was audio and video taped in the process of teaching. At a minimum such data were collected before and after the treatment procedure. During the course of both semesters, each student teacher received feedback from her respective supervising teacher, according to her assigned group. The experimental variable for the study was the measured effect the three different kinds of feedback had upon the classroom verbal interaction of the student teachers. The verbal interaction was measured and codified by use of Flanders' Verbal Interaction Analysis System. Two supervisors of English classes at the Laboratory School, University of Missouri, Columbia, were utilized in this study. Each supervisor worked with six student teachers each semester of the school year 1968 through 1969.

The Research Design

This study utilized an experimental research design which included collection of pre- treatment and post- treatment data for both experimental groups and the control group.

The crux of this investigation rested on the measured percent of the demonstrated change of classroom verbal behavior for each group and individuals within each group. Since the questions which this study attempted to answer dealt with the direction and magnitude of change, all data were subjected to the two tail test of significance at the .05 level of confidence.

The problem was to ascertain the medium, i.e. video, audio or regular supervisory feedback, that had the greatest impact on changing the classroom interactive behavior of selected student teachers as measured by Flanders' Interaction Analysis Categories.

In research hypotheses tested each assumed no difference in student teachers' interactive behavior change, by Flanders' category, from pretest to posttest data associated with video, audio or control groups.

Selection of Student Teachers and Group Assignment

Only female student teachers were selected for this study and each semester three groups were organized with equal cumulative grade point averages. Student teachers with grade point averages between 2.4 and 3.6 on a 4 point scale were selected from the total number of student teachers thus avoiding extremes when establishing the experimental and control groups. These student teacher groupings were then randomly assigned to one of the following groups: (1) video tape experimental; (2) audio tape experimental; or (3) control. This same procedure was followed both semesters. Figure 1 illustrates the research design and student teacher assignment to the various groups.

	First Semester		Second Semester	
	Variable	Student teachers	Variable	Student Teachers
Supervisor A	Video	2	Video	2
	Audio	2	Audio	2
	Control	2	Control	2
Supervisor B	Video	2	Video	2
	Audio	2	Audio	2
	Control	2	Control	2

FIGURE 1

RESEARCH DESIGN USED WITH ENGLISH STUDENT TEACHERS DURING THE 1968-1969 SCHOOL YEAR

Table I illustrates the assignment of the student teachers to their respective groups. It also shows the mean GPA to be 2.7 for all groups.

Collection of the Data

Student teacher-directed classroom sessions were audio taped on five occasions during each semester for the purpose of data collection. A fifteen minute randomly selected segment of each audio taped session was coded utilizing Flanders' Interaction Category System (see Appendix A). The same trained coder classified all tapes for both semesters to maximize internal consistency. Consistent with the accepted use of Flanders' system, the classroom interaction was codified each three seconds and/or each category change.

The Treatment Procedures

Feedback sessions between student teacher and supervisor corresponded with the data collection periods. One third of the student

teachers were shown video tapes of their teaching sessions, one third listened to audio tapes of their teaching sessions, and one third merely discussed their teaching sessions with the supervisor as the other groups had done, but did not have the benefit of video or audio tape replays.

TABLE I

MATCHING FEMALE ENGLISH STUDENT TEACHERS BY GRADE POINT AVERAGE FOR ASSIGNMENT TO TREATMENT AND SUPERVISOR GROUPS

Treatment Group		First Semester Student Teacher G.P.A.	Second Semester Student Teacher G.P.A.	Supervising Teacher # 1	Supervising Teacher # 2
Video		2.5	2.9		
		3.0	2.5	2.7	
		2.7	2.6		
		2.8	2.7		2.7
	Mean	2.75	2.7		
Audio		3.5	2.5		
		2.3	2.6	2.7	
		2.7	2.8		
		2.3	2.8		2.7
	Mean	2.7	2.75		
Control		2.5	2.8		
		2.9	2.6	2.7	
		2.7	2.7		
		2.9	2.5		2.7
	Mean	2.75	2.7		

An attempt was made to control the Hawthorn effect upon the student teachers and their high school English students by assuring that the instruction periods for all three groups were systematically video taped and audio taped. Another factor contributing to the control of this variable was the systematic video taping of all classes in the Laboratory School in which this study was conducted. The television equipment is entirely remotely controlled, which effectively eliminates classroom interruption. For the reasons stated here it was assumed for this study that the act of video taping and audio taping the classroom interaction had little or no effect upon the participants.

Procedures for Data Analysis

Since the concern was for the relative magnitude as well as the direction of the differences, the Wilcoxen matched-pairs signed-

ranks test seemed to be the most useful tool.[18] Utilizing this method the null hypothesis assumes the sum of the positive ranks will equal the sum of the negative ranks. If on the other hand a difference of magnitude is found between sums, it constitutes evidence for the rejection of the null hypothesis that the two sets of measurements are from the same population.[19]

Comparison of the three groups was aided by the computation of the Kruskal-Wallis one-way analysis of variance.[20] This application is consistent with the use of nonparametric statistics with more than two samples. Siegel indicates that, "The Kruskal-Wallis test seems to be the most efficient of the nonparametric tests for k independent samples. It has power-efficiency of $\frac{3}{\pi}$ = 95.5 percent, when compared with the F test, the most powerful parametric test."[21]

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[18]Siegel, op. cit., p. 75.

[19]George A. Ferguson, Statistical Analysis in Psychology and Education. McGraw-Hill Book Company, New York, New York, 1966, page 360.

[20]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences, McGraw-Hill, New York, 1956, pages 184-94.

[21]Ibid., p. 194.

CHAPTER IV

FINDINGS

Considerable data were collected and analyzed in the conduct of this study. A total of twenty four student teachers participated in this study. The twenty four student teachers were video taped and audio taped a minimum of five times during the course of the study. This resulted in approximately one hundred twenty hours of recorded classroom instruction. From each recording of classroom instruction, five minutes were selected randomly and categorized into ten interaction categories. After completing the coding process, these data were entered onto IBM cards to permit analysis through the utilization of an International Business Machines 360-65 computer.

The computer program, used for this study, synthesized the codified data and provided a printout in the form of a ten by ten matrix. This action was accomplished for each of the one hundred twenty, five minute samples of classroom interaction. The data presented in the matrix printout identified the frequency, by three second intervals, that each of the ten categories of interaction were utilized. In addition to the cell frequency count, cell percent data were also presented. The cell percent in this case represented a ratio of interaction category frequency and total interaction frequency.

Codified data from each of the five minute samples of classroom interaction were subsequently separated by feedback group. From these data, ten by ten matrices were constructed for each feedback group by semester and supervising teacher. These data displays enhanced the inspection of the differences within the ten categories between feedback groups, supervising teacher, and semester.

The first five minute sample of classroom interaction for each student teacher was used as base line data and was reported herein as pre- treatment data. The last five minute sample of classroom interaction for each student teacher was established as the post- treatment data. For the purposes of this investigation, the change in classroom interactive behavior was indicated in the differences between the pre- treatment and post- treatment percent scores for each of the ten interaction categories.

From these data described above, percent values were calculated for each of the ten interaction categories by semester, feedback group, and supervising teacher. Since the frequencies of observation codes for each teacher were unequal, the group

percent score for each category was calculated by summing the observations per category for each member (student teacher) within each group and dividing the resultant sum by the total number of observations for each group. The following tables present the statistical findings of this research study. Pre- treatment and post- treatment data for the two experimental variables and the control variable are given. An analysis of the data will follow in a separate section of this report.

TABLE II

PRE- TREATMENT PERCENT OF TOTAL INTERACTION FOR EACH FLANDERS' CATEGORY BY SEMESTER, FEEDBACK GROUP AND SUPERVISING TEACHER

Flanders' Categories	VIDEO GROUP		AUDIO GROUP		CONTROL GROUP	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Supervising Teacher 1						
1	0.6	0.0	0.4	0.0	0.0	0.4
2	4.5	6.9	2.2	5.3	3.5	2.8
3	8.1	8.3	1.7	17.6	3.5	5.3
4	10.3	10.6	10.6	16.8	13.7	6.2
5	44.5	44.4	55.5	25.2	58.6	66.1
6	1.2	0.4	3.5	0.4	0.9	0.4
7	3.6	2.3	2.6	0.4	0.0	1.9
8	10.3	6.9	9.7	7.9	7.3	4.3
9	13.0	13.4	4.3	15.9	6.7	3.8
10	3.6	5.0	8.0	10.1	5.4	8.2
Supervising Teacher 2						
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	1.9	6.0	1.8	0.0	0.9
3	0.8	5.3	8.6	6.0	0.0	15.2
4	8.0	6.2	30.0	6.3	5.0	6.6
5	73.1	68.1	21.5	63.9	84.8	40.9
6	3.4	0.0	2.5	0.0	0.0	0.9
7	1.7	0.0	0.8	0.0	0.0	0.9
8	7.6	2.8	4.3	5.0	3.3	5.7
9	2.1	10.6	23.2	14.8	2.5	19.0
10	2.9	4.8	2.5	1.8	4.2	9.5

Table II provides a summary of the pre- treatment data for each semester, by experimental and control group, and by the supervisor involved. The data for this table were collected early in the semester at which point the student teachers could be called inexperienced. The high percent of classroom interaction recorded in Category 5 supports the previous work of Flanders and Amidon as documented

earlier. The percent score of Category 5 for all groups was 53.9, indicating that over half the classroom instruction time was given to lecture by the teacher. At the same time, when categories 8 and 9 of student response and student initiation were combined, the percent score was 8.4, indicating that in less than ten percent of the classroom instruction time the students were actively involved in classroom interaction.

TABLE III

POST-TREATMENT PERCENT OF TOTAL INTERACTION FOR EACH FLANDERS' CATEGORY BY SEMESTER, FEEDBACK GROUP AND SUPERVISING TEACHER

Flanders Categories	VIDEO GROUP		AUDIO GROUP		CONTROL GROUP	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Supervising Teacher 1						
1	0.0	0.0	0.0	0.0	1.8	0.0
2	4.9	4.1	5.9	3.3	5.4	5.1
3	4.0	7.4	10.9	3.7	10.8	7.0
4	16.0	21.7	13.0	15.1	11.2	16.3
5	24.5	29.1	32.9	24.1	27.9	32.7
6	2.7	0.4	1.6	1.8	0.9	0.0
7	1.7	0.0	0.0	0.0	0.0	0.9
8	15.6	11.5	9.2	24.1	17.1	11.6
9	16.9	16.2	26.1	18.9	20.2	21.0
10	13.3	9.2	0.0	8.5	4.5	5.1
Supervising Teacher 2						
1	4.1	0.0	1.7	0.0	0.0	0.0
2	5.0	3.8	2.5	5.7	1.9	2.1
3	10.9	11.4	11.9	11.4	2.8	14.3
4	9.1	12.3	14.5	3.9	12.3	12.6
5	17.8	47.1	15.3	26.3	60.9	39.1
6	1.3	0.0	1.7	3.0	0.9	0.4
7	1.3	0.0	0.0	0.0	0.9	0.7
8	19.1	4.2	24.7	8.7	1.9	8.6
9	24.6	19.5	15.3	35.0	6.6	16.0
10	6.3	1.4	11.9	5.7	11.4	4.7

Table III presents the post- treatment data organized in the same manner as Table II. Data presented here were a summary of all the groups at the completion of the research study. The student teachers were provided feedback, with or without video or audio aids, and arrived at a position of being experienced student teachers. Even a cursory inspection of the data reveals the reduction in teacher lecture, Flanders' Category 5, and the increase in student participation as categorized by Flanders' 8 and 9. The percent score for Flanders' Category 5 was 31.4 or less than one-third of the total classroom interaction, and the percent scores for Categories 8 and 9 were almost doubled to 16.3 percent of total interaction.

TABLE IV

PERCENT OF TOTAL INTERACTION BY FLANDERS' CATEGORIES OF PRE-TREATMENT AND POST-TREATMENT DATA INCLUDING DIFFERENCE SCORES BY SEMESTER AND TEACHER FOR THE TOTAL VIDEO GROUP

	VIDEO GROUP					
	Semester 1			Semester 2		
Categories	Pre-	Post-	Difference	Pre-	Post-	Difference
Supervising Teacher 1						
1	1.6	0.0	0.6	0.0	0.0	0.0
2	4.5	4.9	0.4	6.9	4.1	-2.8
3	8.1	4.0	-4.1	8.3	7.4	-0.9
4	10.3	16.0	5.7	12.0	21.7	9.7
5	44.5	24.5	-20.0	44.4	29.1	-15.3
6	1.2	2.6	1.4	0.4	0.4	0.0
7	3.6	1.7	-1.9	2.3	0.0	-2.3
8	10.3	15.6	5.3	6.9	11.5	4.6
9	13.0	16.9	3.9	13.4	16.2	2.8
10	3.6	13.3	9.7	5.0	9.2	4.2
Supervising Teacher 2						
1	0.0	4.1	4.1	0.0	0.0	0.0
2	0.0	4.0	5.0	1.9	3.8	1.9
3	8.0	10.9	10.1	5.3	11.4	6.1
4	8.0	9.1	1.1	6.2	12.3	6.1
5	73.1	17.8	-55.3	68.1	47.1	-21.0
6	3.4	1.3	-2.1	0.0	0.0	0.0
7	1.7	1.3	-1.4	0.0	0.0	0.0
8	7.6	19.1	11.5	2.8	4.2	1.4
9	2.12	24.6	22.5	10.6	19.5	8.9
10	2.9	6.3	3.4	4.8	1.4	-3.4

Table IV summarizes the data for the video group only and includes the difference or change scores. Readily apparent was the reduction in Category 5 and the increases in Categories 8 and 9. The interpretation of this table may be aided by an examination of Figure 2. It was not the purpose of this study to prescribe the behavior of a student teacher; however, other studies[22] have been concerned with "goal expectations" and this categorical "goal" is illustrated in Figure 2. The change in the video group, although not of the magnitude of the other study's expectations was nevertheless in the same direction of those expectations.

TABLE V

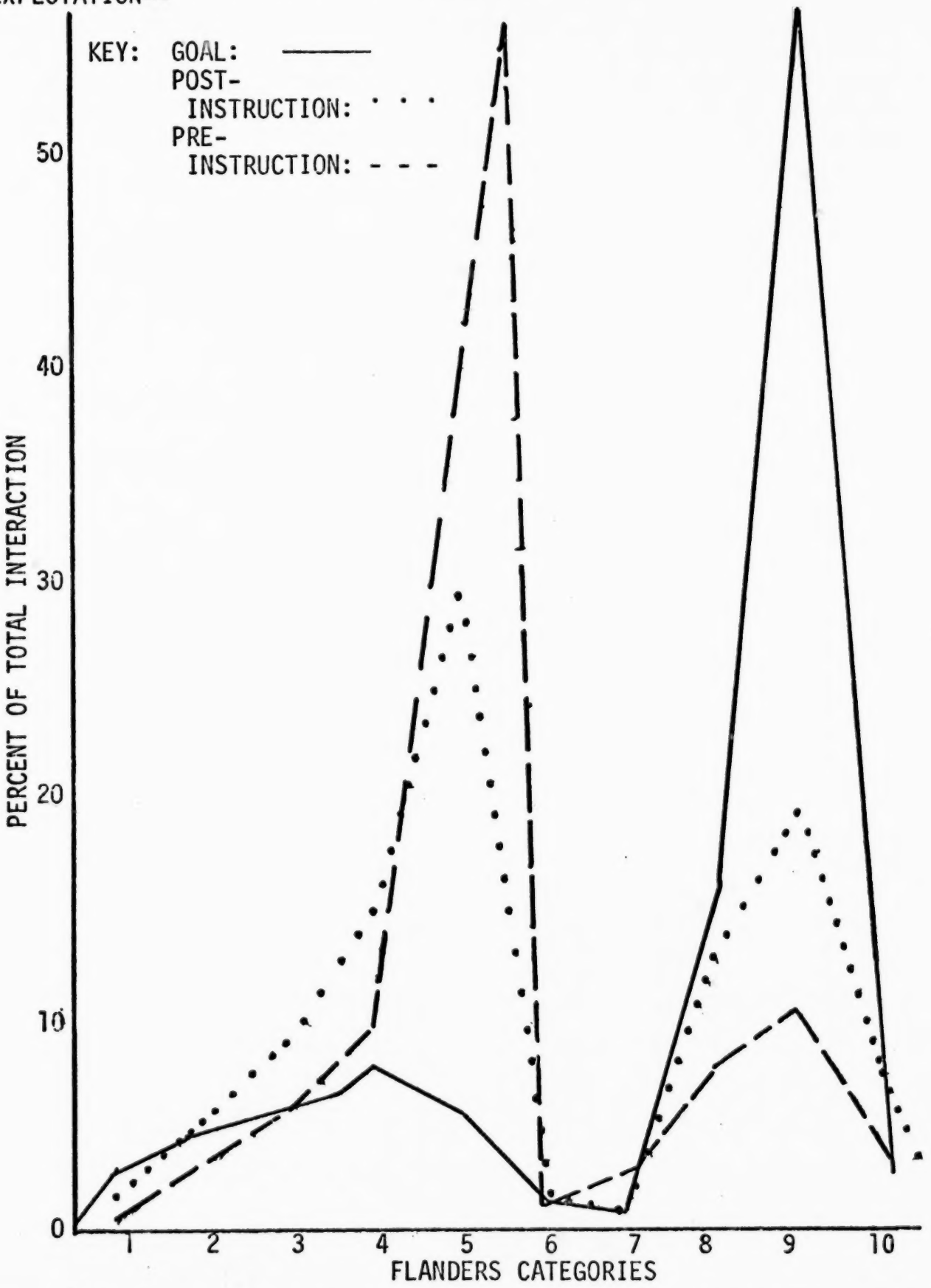
PERCENT OF TOTAL INTERACTION BY FLANDERS' CATEGORIES OF PRE- TREATMENT AND POST- TREATMENT DATA, INCLUDING DIFFERENCE SCORES BY SEMESTER AND TEACHER FOR THE AUDIO GROUP

	AUDIO GROUP					
	Semester 1			Semester 2		
Flanders' Categories	Pre-	Post-	Difference	Pre-	Post-	Difference
Supervising Teacher 1						
1	0.4	0.0	-0.4	0.0	0.0	0.0
2	2.2	5.9	3.7	5.3	3.3	-2.0
3	1.7	10.9	9.2	17.6	3.7	-13.9
4	10.6	13.0	2.4	16.8	15.1	-1.7
5	55.5	32.9	-22.6	25.2	24.1	-1.1
6	3.5	1.6	-1.9	0.4	1.8	1.4
7	2.6	0.0	-2.6	0.4	0.0	-0.4
8	9.7	9.2	-0.5	7.9	24.1	16.2
9	5.3	26.1	20.8	15.9	18.9	3.0
10	8.0	0.0	-8.0	10.1	8.5	-1.6
Supervising Teacher 2						
1	0.0	1.7	1.7	0.0	0.0	0.0
2	6.0	2.5	-3.5	1.8	5.7	3.9
3	8.6	11.9	3.3	6.0	11.4	5.4
4	30.1	14.5	-15.6	6.3	3.9	-2.4
5	21.5	15.3	-6.2	63.9	26.3	-37.6
6	2.5	1.7	-0.8	0.0	3.0	3.0
7	0.8	0.0	-0.8	0.0	0.0	0.0
8	4.3	24.7	20.4	5.0	8.7	3.7
9	23.2	15.3	-7.9	14.8	35.0	20.2
10	2.5	11.9	9.4	1.8	5.7	3.9

[22] Pupil Inquiry Behavior Analysis and Change Activity: Interim Project Report, Raymond C. Manion, Mid-continent Regional Educational Laboratory, Kansas City, Missouri, Report No.1, March 30, 1969.

FIGURE 2

PRE- AND POST- TREATMENT SCORES EXPRESSED AS A PERCENT BY FLANDERS' INTERACTION CATEGORIES OF THE VIDEO GROUP COMPARED WITH AN ESTABLISHED EXPECTATION[23]



[23] Pupil Inquiry Behavior Analysis and Change Activity: Interim Project Report, Raymond C. Manion, Mid continent Regional Educational Laboratory, Kansas City, Missouri, March 30, 1969, pages 14 and 15.

Summary information for the audio group is presented in Table V. Here again the reduction in Category 5 was apparent although not as great as in the video group. This situation might be explained by the fact that their pre- treatment data revealed less opportunity for change than the other two groups. The post- treatment percent of time given to Category 5 of 32.9, 24.1, 15.3 and 26.3 compared favorably with the other group's post- treatment data so there may have been some optimal level of "teacher lecture" below which it was difficult to move.

Table VI presents the summary data for the control group. The change for Category 5 "lecture," was again apparent. The differences in magnitude and direction of change in Categories 8 and 9 that are associated with each supervising teacher revealed a "supervisor" difference that was not as viable when the student teacher had an opportunity to view the classroom activity with the aid of video tape.

TABLE VI

PERCENT OF TOTAL INTERACTION BY FLANDERS' CATEGORIES OF PRE-TREATMENT AND POST- TREATMENT DATA INCLUDING DIFFERENCE SCORES BY SEMESTER AND TEACHER FOR THE CONTROL GROUP

	CONTROL GROUP					
	Semester 1			Semester 2		
Flanders' Categories	Pre-	Post-	Difference	Pre-	Post-	Difference
Supervising Teacher 1						
1	0.0	1.8	1.8	0.4	0.0	-0.4
2	3.5	5.4	1.9	2.8	5.1	2.3
3	3.5	10.8	7.3	5.3	7.0	1.7
4	13.7	11.2	-2.4	6.2	16.3	10.1
5	58.6	27.9	-30.7	66.1	32.7	-33.4
6	0.9	0.9	0.0	0.4	0.0	-0.4
7	0.0	0.0	0.0	1.9	0.9	-1.0
8	7.3	17.1	9.8	4.3	11.6	7.3
9	6.7	20.2	13.5	3.8	21.0	17.2
10	5.4	4.5	-0.9	8.2	5.1	-3.1
Supervising Teacher 2						
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	1.9	1.9	0.9	2.1	1.2
3	0.0	2.8	2.8	15.2	14.3	-0.9
4	5.0	12.3	7.3	6.6	12.6	6.0
5	84.8	60.9	-23.9	40.9	39.1	-1.8
6	0.0	0.9	0.9	0.9	0.4	-0.5
7	0.0	0.9	0.9	0.9	1.7	0.8
8	3.3	1.9	-1.4	5.7	8.6	2.9
9	2.5	6.6	4.1	19.0	16.0	-3.0
10	4.2	11.4	7.2	9.5	4.7	-4.8

Summary information for all three groups is shown in Table VII. This table illustrates the similarity in the three groups. Although there are specific percent score differences, they remained more alike than different.

Figure 3 on page 27 summarizes the post- treatment data for all three groups and contrasts these data with the pre-established goal as reported in Manion's work.[24] Other charts have pointed out the greater change that has taken place in the video as opposed to the audio group and also in the control group as opposed to the audio group. However, Figure 3 illustrates the fact that the audio group came closer to reaching the goal in Flanders' Categories 5, 8 and 9, established for the cited work, than either of the other two groups. This comparison provides evidence that the range of behaviors possible for the audio group may have been less than for the video and control groups.

TABLE VII

SUMMARY OF PRE- TREATMENT AND POST- TREATMENT DATA AS A PERCENT OF TOTAL INTERACTION BY FLANDERS' CATEGORIES, INCLUDING DIFFERENCE SCORES, OF VIDEO, AUDIO AND CONTROL GROUPS

	Video Group			Audio Group			Control Group		
Flanders' Categories	Pre-	Post-	Difference	Pre-	Post-	Difference	Pre-	Post-	Difference
1	0.2	1.0	0.8	0.1	0.2	0.1	0.1	0.5	0.4
2	3.4	4.6	1.2	3.3	4.6	1.3	2.4	3.8	1.4
3	5.8	8.4	2.6	8.2	9.4	1.2	5.1	9.7	4.6
4	9.3	14.8	5.5	13.2	11.2	-2.0	9.2	13.2	4.0
5	56.2	29.4	-26.8	46.3	26.1	-20.2	62.4	37.0	-25.4
6	1.3	1.1	-0.2	1.3	2.1	0.8	0.6	0.5	-0.1
7	2.1	0.8	-1.3	0.9	0.0	-0.9	0.6	0.9	0.3
8	7.3	12.9	5.6	6.9	15.5	8.16	5.6	11.2	5.6
9	10.0	19.3	9.3	13.8	25.3	11.5	6.9	17.5	10.6
10	4.0	7.7	3.7	5.6	5.6	0.0	6.5	5.7	-0.8

It should be stated at this point that no such goal expectations were held for this particular research study. No attempt was made to prescribe the amount or kind of verbal interaction that was to occur in the classroom. The topic of investigation was merely the effect of either audio tape feedback or video tape feedback as opposed to regular supervisory feedback in creating interactive change within the classroom. The inclusion of the Manion[25] report in this

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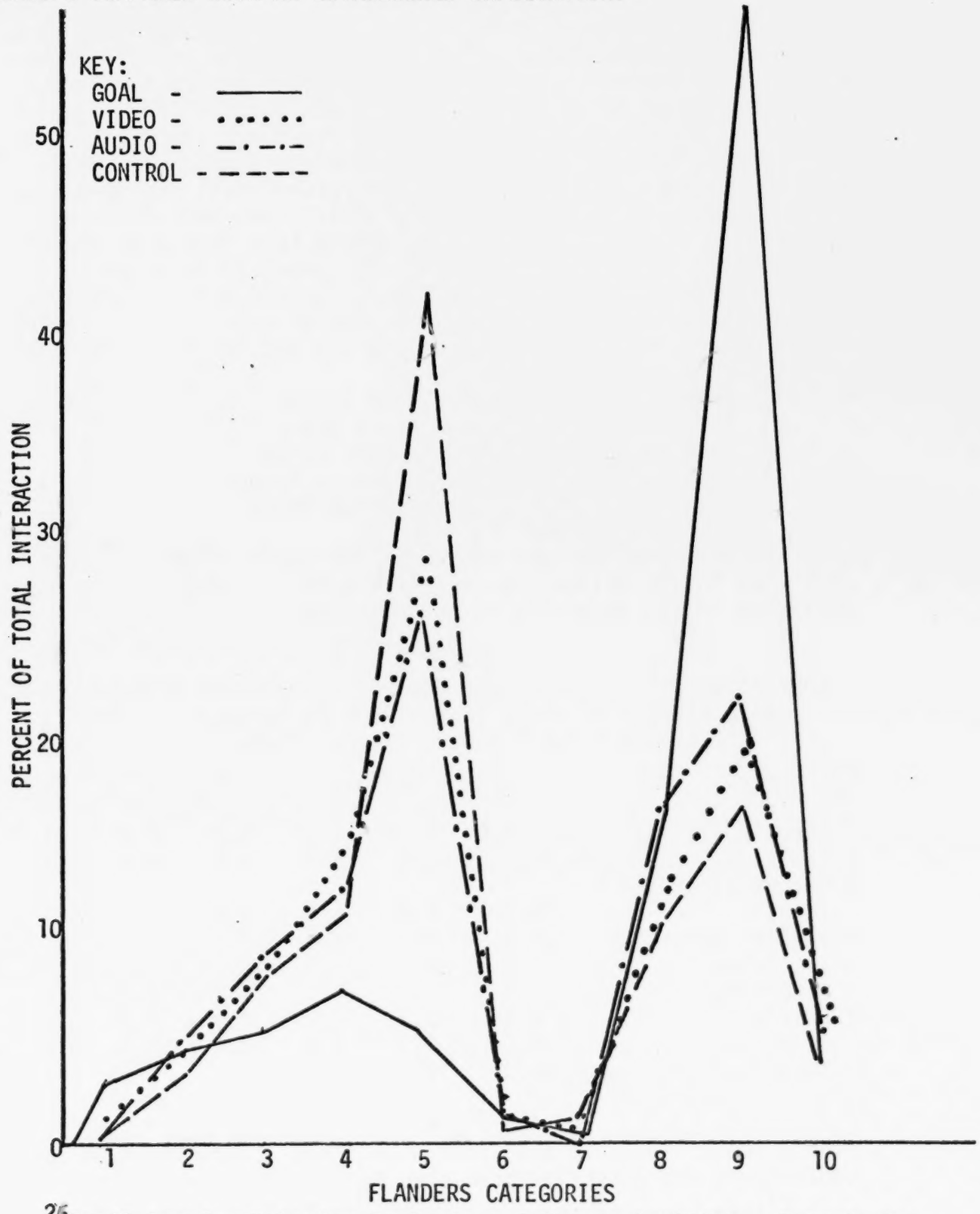
[24] Ibid., pp. 14-15.

[25] Ibid., pp. 14-15.

FIGURE 3

POST- TREATMENT PERCENT SCORES EXPRESSED AS A PERCENT OF TOTAL INTERACTION BY FLANDERS' INTERACTION CATEGORIES OF THE VIDEO, AUDIO AND CONTROL GROUPS COMPARED WITH AN ESTABLISHED EXPECTATION.[26]



[26] Pupil Inquiry Behavior Analysis and Change Activity: Interim Project Report, Raymond C. Manion, Mid continent Regional Educational Laboratory, Kansas City, Missouri, March 30, 1969. pages 14 and 15.

study was merely to serve as an illustration of what some authorities believe was appropriate and to indicate that these findings do not differ greatly from the cited research.

Table VIII serves to further illustrate a comparison among the groups in this research study with established expectations or goals that have been established through other research utilizing the Flanders' Instrument. This table of the pre- and post- treatment scores expressed as a percent of the total interaction utilizing Flanders' Interaction Categories shows the great similarity that the three groups held with the goal expectations at the conclusion of the study. The area of greatest differences still remained category five where the goal was ten percent. The audio group at 26 percent and the video group at 29 percent most nearly approached the category five goal, but the control group at 37 percent indicated a larger amount of time spent in lecturing than indicated by the goal. The other areas are very similar and the direction of change was in accord with the goal in all but the following categories:

1) Category 10, Silence - Video Group
2) Category 4 Questions - Audio Group
3) Category 6, Directions - Audio Group
4) Category 6, Directions - Control Group
5) Category 7, Criticism - Control Group

The remaining percent scores of the twenty-five categories, of the total thrity categories, within the three groups increased or decreased in the direction of the cited goal.

TABLE VIII

COMPARISON OF PRE- TREATMENT AND POST- TREATMENT SCORES EXPRESSED AS A PERCENT OF TOTAL INTERACTION BY FLANDERS INTERACTION CATEGORIES BETWEEN GROUPS AND ESTABLISHED EXPECTATIONS

Categories		Video		Audio		Control	
	Goal[27]	Pre-	Post-	Pre-	Post-	Pre-	Post-
1 Accepts Feeling	0.5	0.2	1.0	0.1	0.2	0.1	0.5
2 Praise	4.0	3.4	4.6	3.3	4.6	2.4	3.8
3 Use of Student Ideas	10.0	5.8	8.4	8.2	9.4	5.1	9.7
4 Teacher Questions	20.0	9.3	14.8	13.2	11.2*	9.2	13.2
5 Lecturing	10.0	56.2	29.4	46.3	26.1	62.4	37.0
6 Directing	1.0	1.3	1.1	1.3	2.1*	0.6	0.5*
7 Criticizing	0.5	2.1	0.8	0.9	0.0	0.6	0.9*
8 Student Response	20.0	7.3	12.9	6.9	15.5	5.6	11.2
9 Student Initiation	30.0	10.0	19.3	13.8	25.3	6.9	17.5
10 Silence and Confusion	4.0	4.0	7.7*	5.6	5.6	6.5	5.7

*These scores indicate a change in the post- treatment data that is contrary to the direction predicted by the goal expectations.

[27] Ibid., pp. 14-15.

In analyzing descriptive categorical data it is logical to look not only at the data relating to the individual categories, but also at the data from combined categories. That is to say, if it is important to know the percent of instruction time utilized by students in "initiating activities," Flanders' Category 9, it is just as important to ascertain the percent of total "student verbal interaction" which is a combination of the data from Flanders' Category 8, "student response" and Category 9, "student initiation." For the purposes of this study, the resultant data from several such combinations were analyzed.

One amalgemation of categorical data combined the scores within each group and the pre- and post- treatment results for Flanders' Categories; (1) "accepts feeling," (2) "praises students," (3) uses student ideas," and (4) "teacher questions." Flanders and Amidon refer to this combination of data as the, "indirect teaching influence." Table IX, presents the data by groups and treatment for the percent on "indirect teaching influence." The most obvious finding was that the experimental group receiving audio feedback used "indirect teaching influence" less frequently than before the treatment. The other two, video experimental and control groups, used "indirect teaching influence" more frequently at the post- treatment data collection point.

The data from Categories 8 and 9 were combined to provide an index of "student talk." Table X illustrates that the percent score changes (gains) from pre- treatment to post- treatment were in the positive direction. That is to say that all three groups demonstrated an increase in the percent of instruction time devoted to "student talk." The gain scores between groups proved to be nonsignificant when subjected to statistical tests.

TABLE IX

COMPARISON OF INDIRECT TEACHER INFLUENCE AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 1, 2, 3 AND 4 EXPRESSED AS THE PERCENT TO TOTAL TALK FOR PRE- AND POST- TREATMENT OBSERVATIONS FOR THE VIDEO, AUDIO, AND CONTROL FEEDBACK GROUPS

Indirect Teacher Influence Expressed as a Percent of Total Interaction			
GROUP	Pre-Instruction	Post-Instruction	Change from Pre- to Post-
Video	18.7	28.6	9.9
Audio	25.8	25.3	-.5
Control	16.8	27.2	10.4

TABLE X

COMPARISON OF STUDENT TALK AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 8 AND 9 EXPRESSED AS THE PERCENT OF TOTAL TALK FOR PRE- AND POST- TREATMENT OBSERVATIONS FOR THE VIDEO, AUDIO, AND CONTROL FEEDBACK GROUPS

Student Talk Expressed as a Percent of Total Interaction			
GROUP	Pre-Instruction	Post-Instruction	Change from Pre- to Post-
Video	17.3	32.0	14.7
Audio	20.7	40.5	19.8
Control	12.5	28.3	15.8

An index of "direct teaching influence" was accomplished by combining the data from Categories 5 "lecturing," 6 "directing" and 7 "criticizing." The percent change scores from pre- treatment to post- treatment data for all three groups, video, audio and control were found to be in a negative direction. Interpretation of these data indicated that "direct teaching influence" was used less frequently by all three groups at the close of the project than at the initiation of the program. Table XI illustrates the facts stated above.

TABLE XI

COMPARISON OF DIRECTIVE TEACHER TALK AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 5, 6, AND 7 EXPRESSED AS THE PERCENT OF TOTAL TALK FOR PRE- AND POST- TREATMENT OBSERVATIONS FOR THE VIDEO, AUDIO, AND CONTROL FEEDBACK GROUPS

Direct Teacher Talk Expressed as a Percent of Total Interaction			
GROUP	Pre-Instruction	Post-Instruction	Change from Pre- to Post-
Video	59.6	31.3	-28.3
Audio	48.5	28.2	-20.3
Control	63.6	38.4	-25.2

A major concern of this study was the relative magnitude as well as the direction of change, be it gain or loss, demonstrated by each of the three groups. The Wilcoxen test for matched pairs - signed ranks seemed to be an appropriate statistical tool.[28] In using the Wilcoxen test, the null hypothesis assumes the sum of

[28]Siegel, op. cit., p. 75.

positive ranks will equal the sum of negative ranks. From this comparison the inference is made, that a difference of any magnitude between positive and negative sums, constitutes evidence for the rejection of the null hypothesis that the sets of measurements are from the same population.[29]

In utilizing the Wilcoxen test, the requirements of matched pairs were met by treating the individual percent scores from the pre- treatment data collection point and the post- treatment data collection point as a matched pair. This test in effect compares pre- treatment percent data for each Flanders' Category to the post- treatment percent for the same category. An inference may be made from the results pertinent to the difference between scores. That is to say if the post- treatment percent score for a given category is significantly different than the percent score for the same category for the pre- treatment, an inference could be made that the magnitude of change was also significant. The reader must bear in mind when interpreting the Wilcoxen test results recorded in this report that the inference described above was made by the investigators.

Table XII summarizes the finding resulting from the application of the Wilcoxen test the combined data from categories 1, 2, 3 and 4, which constitutes the index of "indirective teaching influence".

TABLE XII

COMPARISON OF WILCOXEN T VALUES FOR THE INCREASE IN NON DIRECTIVE TEACHING INFLUENCE AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 1, 2, 3 AND 4 BETWEEN THE VIDEO, AUDIO AND CONTROL FEEDBACK GROUPS

Groups	Number of Student Teachers	Positive Value	Negative Value	Calculated T Value	T Value Required for Sig. at .05
Video	8	35	1	1*	4 or less
Audio	8	16	20	16	4 or less
Control	8	29	7	7	4 or less

* The T Value of 4 for the Video Feedback Group was found to be statistically significant at the .05 level of confidence.

In analyzing the data in Table XII the most pertinent finding was the significant increase in frequency of "indirect teaching influence" demonstrated by the video experimental group. The change,

[29]Ferguson, op. cit., p. 360.

in this case gain, was found to be significant at the .01 level of confidence. The measured gain scores for this variable were not statistically significant for the audio experimental and control groups.

Combining data from Categories 8 and 9 produced the percent of "student talk." As indicated in Table XIII the change and/or gain, was in a positive direction for all three groups. However, the amount of gain proved to be statistically significant in only the video experimental group. The calculated Wilcoxen T value of four for the video group was significant at .05 level of confidence.

TABLE XIII

COMPARISON OF THE WILCOXEN T VALUES FOR THE INCREASE IN STUDENT TALK AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 8 AND 9 BETWEEN THE VIDEO, AUDIO AND CONTROL FEEDBACK GROUPS

Groups	Number of Student Teachers	Positive Values	Negative Values	Calculated T Value	T Value Required for Significance at .05
Video	8	32	4	4	4 or less
Audio	8	31	5	5	4 or less
Control	8	31	5	5	4 or less

"Direct teacher influence" which consists of data from combined categories 5, 6 and 7 decreased during the investigation period for all three groups. While a decrease in "direct teacher influence" existed for all groups, only the decrease found within the video experimental group was significant at the .02 level of confidence.

TABLE XIV

COMPARISON OF WILCOXEN T VALUES OF THE DECREASE IN "DIRECT TEACHER INFLUENCE" AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORIES 5, 6 AND 7 BETWEEN THE VIDEO, AUDIO AND CONTROL FEEDBACK GROUPS

Groups	Number of Student Teachers	Positive Values	Negative Values	Calculated T Value	T Value Required for Significance at .05
Video	8	2	34	2	4 or less
Audio	8	10	26	10	4 or less
Control	8	7	29	7	4 or less

Since the Flanders' Verbal Interaction instrument classifies the total verbal interaction taking place in a classroom into one

of ten descriptive categories, it seemed logical to assume that if the percent of "student talk" and "indirect teacher influence" increased significantly for the video experimental group the percent of "teacher lecture" would decrease significantly. Table XV presents data to substantiate the stated assumption. The decrease in "teacher lecture," Flanders' Category 5, for the video group was found to be significant at the .02 level. Comparison of the pre- treatment percent scores with the post- treatment percent scores for the audio experimental and control groups were not significant.

TABLE XV

COMPARISON OF WILCOXEN T VALUES FOR THE DECREASE IN TEACHER LECTURE AS CODED BY FLANDERS' VERBAL INTERACTION CATEGORY 5 BETWEEN THE VIDEO, AUDIO AND CONTROL FEEDBACK GROUPS

Groups	Number of Student Teachers	Positive Values	Negative Values	Calculated T Values	T Value Required for Significance at .05
Video	8	2	34	2	4 or less
Audio	8	10	26	10	4 or less
Control	8	9	27	9	4 or less

Some insights pertinent to the stated problem resulted from applying the Wilcoxen test to the pre- treatment and post- treatment scores by Flanders' Category for both experimental and control groups. However the Wilcoxen test is not designed to provide information relative to the variance within and between groups. The type of data collected for this study required that a nonparametric test of mean difference be utilized. Siegel indicates that,

> The Kruskal-Wallis one way analysis of variance test seems to be the most efficient of the nonparametric tests for the k independent samples. It has power-efficiency of $\frac{3}{\pi} = 95.5$ percent, when compared with the F test, the most powerful parametric test.[30]

In applying the Kruskal-Wallis test, the data utilized were the percent scores for each of the ten Flanders' Categories and for each experimental and control group.

Results of the Kruskal-Wallis tests for each of the Flanders' Ten Categories of classroom interaction are shown in Table XVI. No significant difference at the .05 level of confidence was found between groups for the ten categories.

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[30]Siegel, op. cit., p. 194.

TABLE XVI

KRUSKAL-WALLIS ONE WAY ANALYSIS OF VARIANCE BY RANKS FOR FLANDERS' CATEGORIES, ONE THROUGH TEN, COMPARING THE VIDEO EXPERIMENTAL, AUDIO EXPERIMENTAL AND CONTROL GROUPS

Flanders' Category	Numbers of Student Teachers	Number of Groups(K)	Degree of Freedom (K-1)	Kruskal-Wallis H Value	P
1 Accepts Feelings	24	3	2	.27	.20
2 Praise	24	3	2	1.50	.50
3 Uses Student Ideas	24	3	2	.09	.10
4 Teacher Questions	24	3	2	2.85	.20
5 Lecture	24	3	2	1.75	.30
6 Directions	24	3	2	.76	.30
7 Criticism	24	3	2	1.04	.40
8 Student Response	24	3	2	.36	.20
9 Student Initiation	24	3	2	.28	.20
10 Silence	24	3	2	3.92	.10

Chapter V of this report presents a summary, the conclusions reached, and the implications involved in this study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Previous chapters of this study have presented the problem, research procedures, related research and the findings. This chapter contains a summary of the information. In addition, the information has been synthesized in order to draw implications and conclusions from the facts identified in this study.

Nature of the Problem

Ascertaining the effect of video and audio recorded feedback in addition to normal supervisory feedback upon the classroom verbal interaction of student teachers was the problem with which this study was concerned.

A review of the literature disclosed few empirical investigations germane to the problem. While many studies reported wide use of video and/or audio feedback to teachers, few have attempted to measure the impact of such feedback in an objective manner. This lack of empirical evidence concerning the effect of video and/or audio recorded feedback to teachers demonstrated a need for this study.

Research Procedures

In general the research procedures utilized in this study were as follows. In both the fall and winter semesters, twelve student teachers of English were selected, matched on grade point average, and assigned to one of three groups: (1) video experimental; (2) audio experimental; or (3) control. During both semesters each student teacher was audio and video taped in the process of teaching. During the course of the semester each student teacher, according to her assigned group, received a specific type of feedback from her supervising teacher. The independent variables for the study were the three modes of feedback and the dependent variable was the classroom verbal interaction of the student teachers. The verbal interaction was measured and codified using Flanders' Verbal Interaction Analysis System.[31]

Summary of the Findings

The general research hypothesis of this investigation was based upon three researchable questions. Each question is presented below with the findings and conclusions pertinent to the nature of the questions.

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[31] Flanders, op. cit.

Question 1:

Will the act of seeing and hearing oneself teach via video tape recordings effect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

1. Data obtained from analyzing pre- treatment and post-treatment percent scores for the video group demonstrated a decrease in teacher lecture, Category 5, and an increase in student initiation Category 9. These data are presented in Table IV.

2. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represents "teacher lecture." The resultant T value was found to be significant at .02 level of confidence.

3. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represented "direct teaching influence." The resultant T value was found to be significant at .02 level of confidence.

4. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for categorical data which represented the "indirect teaching influence." The resultant T value was found to be significant at .01 level of confidence. These data are presented in Table XII.

5. The difference in pre- treatment and post- treatment data for the video group, in Category 5 "lecture" decreased, while Categories 8 and 9 "student talk" increased. These data are shown in Table IV.

6. The video group pre- treatment percent score was found to be significantly different from the post- treatment percent score for the categorical data which represented "student talk." The resultant T value was found to be significant at .05 level of confidence. These data are illustrated in Table XIII.

It was concluded from analysis of the above stated findings that the process of video recording student teachers in the act of teaching, and utilizing the recorded teaching sequence as feedback as a supplement to the regular supervisory procedures, tends to change some aspects of student teachers' instructional behavior.

Specifically, the evidence indicates that the student teachers receiving video feedback utilize less "direct teaching influence" and more "indirect teaching influence" as categorized by Flanders' Verbal Interaction Analysis System.

Question 2:

Will the act of hearing oneself teach via audio tape recordings affect a greater change in one's verbal teaching behavior than simply discussing the teaching activity with a supervisor?

1. Data obtained from analyzing pre- treatment and post- treatment percent scores for the audio group demonstrated a decrease in "teacher lecture," Category 5. These data are presented in Table V.

2. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "teacher lecture." The resultant T value was found to be 10 and not significant at .05 level of confidence. These data are presented in Table XV.

3. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "direct teaching influence." The resultant T value was found to be 10 and not significant at .05 level of confidence. These data are presented in Table XIV.

4. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "indirect teaching influence." The resultant T value was found to be 16 and not significant at .05 level of confidence. These data are presented in Table XII.

5. The audio group pre- treatment percent score was found to be not significantly different from the post- treatment percent score for the categorical data which represents "student talk." The resultant T value was found to be 5 and not significant at .05 level of confidence. These data are tabulated in Table XIII.

6. The audio group demonstrated a percent score decrease in "indirect teaching" compared to an increase for the video group and control group. These data are presented in Table IX.

In analyzing the findings relevant to the second research question stated above, it was concluded that utilizing the process of audio recording student teachers in the act of teaching and subsequently studying the recorded teaching sequence with the supervising teacher, effects some change in the instructional behavior of the student teacher. However, it was evidenced in this study that within the audio group, the magnitude of change in the student teachers' instructional behavior was not statistically significant.

Question 3:

Will the act of seeing and hearing oneself via video tape recordings affect a greater change in one's verbal teaching behavior than hearing oneself teach via audio tape recordings while discussing the teaching activity with a supervisor?

1. Data obtained from pre- treatment and post- treatment percent scores for all three groups demonstrated an increase in the percent of "student talk." These data are presented in Table X.

2. Data obtained from pre- treatment and post- treatment percent scores for all three groups demonstrated a decrease in "direct teaching influence." These data are presented in Table XI.

3. Data obtained for pre- treatment and post- treatment percent scores for all three groups demonstrated a decrease from over 50 to 33 percent of "lecture." These data are presented in Table III.

4. Post- treatment percent scores for all three groups demonstrated agreement to an established goal. These data are presented in Table VIII.

5. Data obtained for pre- treatment and post- treatment percent scores for all three groups demonstrated no significant difference between groups by interaction category. These data are presented in Table XVI.

It was concluded from the above stated findings that the utilization of audio recorded feedback in addition to the regular supervisory feedback would tend to effect changes in the interaction categories of "student talk," "direct teaching influence" and "lecture" but not to the degree as would be expected utilizing video recorded feedback.

Related Findings

1. Pre- treatment and post- treatment scores for all three groups were compared with an expected goal. The change whether positive or negative was in the direction of the goal in five of the six categories tested. The video groups displayed an increase in the broad category of "silence or confusion." The audio groups displayed a decrease in "teacher questions" and an increase in "teacher directing." The control group displayed only minor changes, a decrease in "directing" and an increase in "criticizing." Post- treatment data for Categories 1, 2 and 3 for all groups are very similar to the goal expectations. These data are presented in Table VIII.

2. In the control group the amount of "lecture," Category 5, decreased when the post- treatment data were compared to the pre-treatment data. A difference in the two supervising teachers seems to be related to the changes found in Categories 8 and 9, "student talk." The change for supervisor one was 11.9 percent, with all changes in the positive direction, while the data for Categories 8 and 9 "student talk" associated with supervisor two was both positive and negative. These data are shown in Table VI.

3. A summary of difference scores for all three groups disclosed a similarity of directional change for all three groups. These data are shown in Table VII.

4. The post- treatment percent of total interaction found in Category 5 decreased by a factor of 3 while percent scores for Categories 8 and 9 almost doubled. These data are shown in Table III.

General conclusions drawn from the related findings were as follows:

1. The process of supervisory feedback to student teachers, regardless of whether such feedback was supplemented by video or audio recordings of the student teaching act, demonstrated directional changes in instructional behavior as measured by Flanders' Ten Categories when compared to "ideal" category goals postulated by another study.[32]

2. The magnitude of the directional change is greater for those student teachers receiving video or audio recorded feedback than the magnitude of change in the control group. However, the difference in the magnitude of change in each of the Flanders' Ten Categories between the three groups was statistically insignificant.

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[32]Manion, op. cit., pp. 14-15.

3. The personality, training, and other such intangible characteristics of supervising teachers may influence the effect of supervisory feedback sessions.

Summary of Findings and Conclusions

Thirteen null hypotheses were tested during the conduct of this investigation. Of the null hypotheses tested, three of the thirteen were rejected.

The first significant finding provided statistical evidence that the student teachers in the video feedback experimental group utilized "indirect teaching influence" significantly more frequently after the treatment than they did before experiencing video replay and discussion with their supervising teacher. It was evidenced by the second significant finding that the video group student teachers permitted significant increases in student verbal participation. The third significant finding provided evidence that the student teachers in the video group significantly reduced their use of direct teaching methods during the conduct of this study. An analysis of the three statistically significant findings described above revealed that as the student teachers in the video group utilized significantly less lecture and other "direct teaching influences," they resorted to more frequent use of "indirect teaching influences," this change apparently stimulated a significant increase in student verbal participation.

Equally important to the questions this study attempted to investigate were the eleven null hypotheses which were not rejected. It was found that the audio experimental group and the control group student teachers did not demonstrate a statistically significant change in teaching behavior as classified by Flanders' Verbal Interaction Analysis System.

An attempt was made to determine the significance of the change scores for each of Flanders' Ten Categories for the three groups. The information from this test indicated the null hypotheses associated with these variables could not be rejected.

The following implications were postulated from the general findings and conclusions of this study.

1. Acknowledging the need to provide more effective supervisory feedback to aid the student teacher in his professional training, it seems reasonable to infer from this study that utilizing video recorded classroom interaction as part of the supervisory process would have positive results.

2. The effect of video and audio supplemented supervisory feedback could be enhanced by having supervising teachers highly trained in the use of various feedback media.

Recommendations for Further Study

This study provides some insights into the use of audio and video recordings of classroom interaction as feedback to student teachers. Obviously many questions remain unanswered. Some of the more conspicuous questions are as follows.

1. Would audio or video supervisory feedback change significantly the instructional behavior of pre- or in-service teachers if the supervisor followed a detailed and structured program of providing feedback?

2. What effect, if any, does audio or video supervisory feedback to pre- and/or in-service teachers have upon the achievement of their pupils?

3. Would there be a measured difference in classified instructional behavior if this study were replicated using three different generally accepted classroom interaction classification systems?

4. Would a combination of audio and video supervisory feedback effect a greater magnitude of instructional behavior change in pre- and/or in-service teachers than would be expected by using video feedback or audio feedback separately?

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APPENDIX A

SUMMARY OF FLANDERS'
CATEGORIES FOR INTERACTION ANALYSIS*

TEACHER	INDIRECT INFLUENCE	1. ACCEPTS FEELING: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included. 2. PRAISES OR ENCOURAGES: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying, "um hm?" or "go on" are included. 3. ACCEPTS OR USES IDEAS OF STUDENT: clarifying, building, or developing ideas suggested by a student. As teacher brings more of his own ideas into play, shift to category five. 4. ASKS QUESTIONS: asking a question about content or procedure with the intent that a student answer.
TEACHER TALK	DIRECT INFLUENCE	5. LECTURING: giving facts or opinions about content or procedures; expressing his own ideas, asking rhetorical questions. 6. GIVING DIRECTIONS: Directions, commands, or orders to which a student is expected to comply. 7. CRITICIZING OR JUSTIFYING AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
STUDENT	TALK	8. STUDENT TALK--RESPONSE: talk by students in response to teacher. Teacher initiates the contact or solicits student statement. 9. STUDENT TALK--INITIATION: talk by students which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
		10. SILENCE OR CONFUSION: pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

*Amidon, Edmund, J., and Flanders, Ned A. The Role of the Teacher in the Classroom, Revised edition Minneapolis: Assiciation for Productive Teaching, In., 1967, p. 14.

APPENDIX B

INTERACTION ANALYSIS MATRIX

			1	2	3	4	5	6	7	8	9	10
INDIRECT TEACHER TALK	ACCEPTS FEELING	1										
	PRAISES OR ENCOURAGES	2										
	USES IDEAS OF STUDENT	3										
	ASKS QUESTIONS	4										
DIRECT TEACHER TALK	LECTURING	5										
	GIVING DIRECTIONS	6										
	CRITICIZING	7										
STUDENT TALK	STUDENT TALK -- RESPONSE	8										
	STUDENT TALK -- INITIATION	9										
	SILENCE OR CONFUSION	10										
		Total										
		%										

APPENDIX C

APPENDIX

SAMPLE CODING SHEET

1.	10 *	21.	8	41.	7
2.	10	22.	8	42.	10
3.	5	23.	9	43.	10
4.	5	24.	9	44.	10
5.	5	25.	9	45.	10
6.	6	26.	9	46.	10
7.	6	27.	9	47.	6
8.	6	28.	9	48.	6
9.	6	29.	9	49.	10
10.	4	30.	9	50.	10
11.	4	31.	1	51.	4
12.	4	32.	1	52.	10
13.	8	33.	2	53.	10
14.	8	34.	2	54.	5
15.	8	35.	9	55.	5
16.	3	36.	9	56.	5
17.	5	37.	9	57.	5
.	5	38.	10	58.	5
19.	4	39.	10	59.	5
20.	10	40.	7	60.	5

* Process used for pairing observed instructional behavior to enter into the 10 x 10 matrix.

APPENDIX D

TEACHER NUMBER 23 SCHOOL NUMBER 3 DATE 4-8-69

	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0	0	0	0	0	0	0	8	0	2
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.83	0.0	1.70
5	0	0	0	3	83	0	0	0	0	0
PER	0.0	0.0	0.0	2.56	70.94	0.0	0.0	0.0	0.0	0.0
6	0	0	0	1	1	0	0	0	0	0
PER	0.0	0.0	0.0	0.85	0.85	0.0	0.0	0.0	0.0	0.0
7	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0	0	0	4	2	1	0	5	1	0
PER	0.0	0.0	0.0	3.41	1.70	0.85	0.0	4.27	0.85	0.0
9	0	0	0	1	0	1	0	0	1	0
PER	0.0	0.0	0.0	0.85	0.0	0.85	0.0	0.0	0.85	0.0
10	0	0	0	1	1	0	0	0	1	0
PER	0.0	0.0	0.0	0.85	0.85	0.0	0.0	0.0	0.85	0.0
TOTAL	0	0	0	10	87	2	0	13	3	2
PER	0.0	0.0	0.0	8.54	75.35	1.70	0.0	11.11	2.56	1.70

GRAND TOTAL=117

TOTAL PERCENT OF INDIRECT TEACHER TALK=8.547
INDIRECT TEACHER TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
1	0.0
2	0.0
3	0.0
4	100.000

TOTAL PERCENT OF DIRECT TEACHER TALK=76.068
DIRECT TEACHER TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
5	97.753
6	2.247
7	0.0

TOTAL PERCENT OF STUDENT TALK=13.675
STUDENT TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
8	81.250
9	18.750

PERCENT OF SILENCE OR CONFUSION=1.709

RATIO OF INDIRECT TO DIRECT TEACHER TALK=0.112

TEACHER NUMBER 22 SCHOOL NUMBER 3 DATE 4-8-69

	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0	0	1	0	0	0	0	0	0	0
PER	0.0	0.0	0.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0	0	4	0	3	0	0	0	2	0
PER	0.0	0.0	3.33	0.0	0.0	0.0	0.0	0.0	1.66	0.0
4	0	0	0	3	0	0	0	8	0	0
PER	0.0	0.0	0.0	2.50	0.0	0.0	0.0	6.66	0.0	0.0
5	0	0	0	4	69	0	0	0	0	0
PER	0.0	0.0	0.0	3.33	57.50	0.0	0.0	0.0	0.0	0.0
6	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0	0	0	0	0	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0	0	1	3	1	0	0	7	3	0
PER	0.0	0.0	0.83	2.50	0.83	0.0	0.0	5.83	2.50	0.0
9	0	1	3	1	0	0	0	0	5	0
PER	0.0	0.83	2.50	0.83	0.0	0.0	0.0	0.0	4.16	0.0
10	0	0	0	0	1	0	0	0	0	0
PER	0.0	0.0	0.0	0.0	0.83	0.0	0.0	0.0	0.0	0.0
TOTAL	0	1	9	11	74	0	0	15	10	0
PER	0.0	0.83	7.50	9.16	61.66	0.0	0.0	12.50	8.33	0.0

GRAND TOTAL=120

TOTAL PERCENT OF INDIRECT TEACHER TALK=17.50
INDIRECT TEACHER TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
1	0.0
2	4.76
3	42.85
4	52.38

TOTAL PERCENT OF DIRECT TEACHER TALK-61.66
DIRECT TEACHER TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
5	100.00
6	0.0
7	0.0

TOTAL PERCENT OF STUDENT TALK=20.83
STUDENT TALK DISTRIBUTED AS FOLLOWS

CATEGORY	PERCENT
8	60.00
9	40.00

PERCENT OF SILENCE OR CONFUSION=0.0

RATIO OF INDIRECT TO DIRECT TEACHER TALK=0.28